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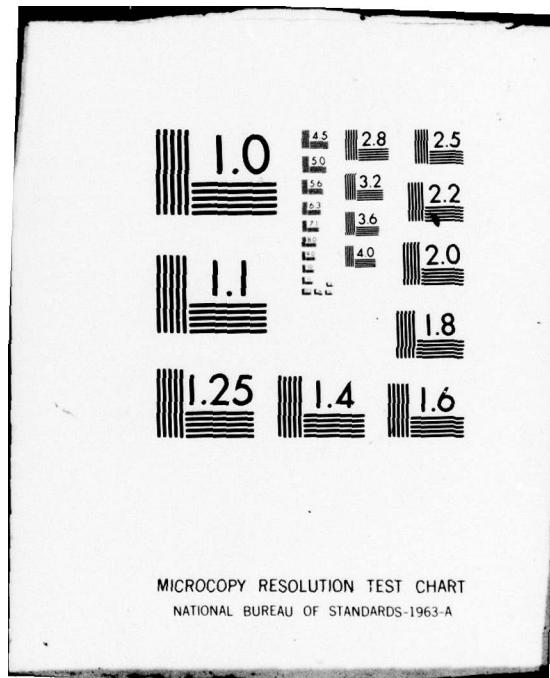
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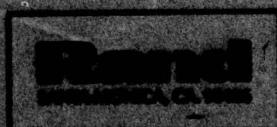
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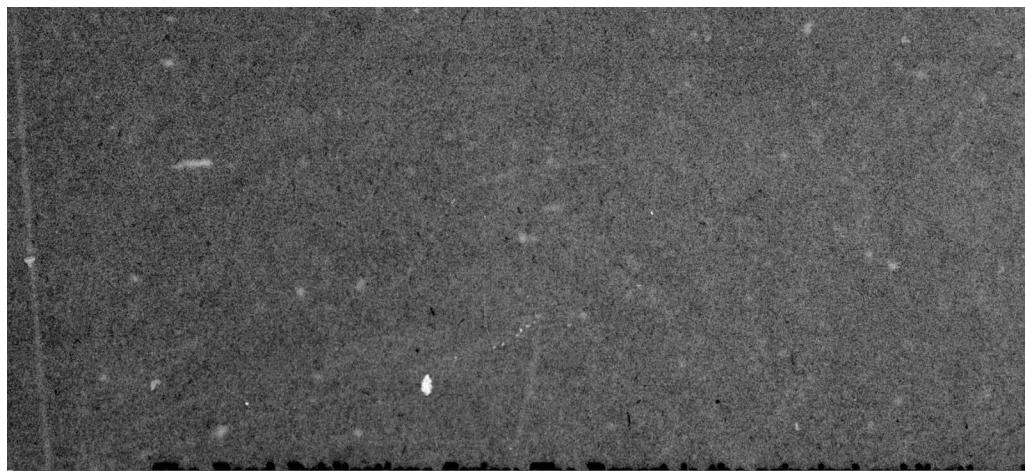
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Briefly reviews the strategies Chinese decision-makers have used since 1949 to modernize their defense establishment. The study then considers recent efforts to amend previous strategies in military research, development, and production, most notably through possible purchases of advanced foreign military technology. Rapid and extensive purchase of weaponry abroad is not a worthwhile security option for China. The available budgetary and manpower resources are insufficient, and such an approach would not significantly enhance Chinese security over the short run. Thus, any major improvement in the PRC's military capabilities will occur only after a prolonged process of economic development, industrial growth, and sustained technological absorption. An effective U.S. policy framework for technology transfer to the PRC must pay careful heed to the long-term manpower and budgetary constraints that will continue to affect the modernization of China's armed forces. (Author)

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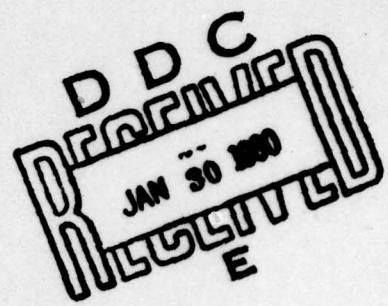
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DEFENSE MODERNIZATION IN THE PEOPLE'S REPUBLIC OF CHINA

Jonathan D. Pollack



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PREFACE

The study reported on in this note is part of a larger study of China's emerging regional and strategic roles now being undertaken at The Rand Corporation under the sponsorship of Project AIR FORCE. A central task of this inquiry is to assess changes in the security strategies adopted by the People's Republic of China (PRC) during the 1970s and to determine the extent to which such changes have been the subject of leadership debate. In an effort to clarify the context within which Chinese decisionmakers have had to formulate national security policy, it seemed both fruitful and necessary to consider first some of the more general economic and technological issues affecting such decisions. This study discusses these issues in both historical and contemporary perspective. It is intended to serve as a conceptual introduction rather than as a comprehensive analysis and is therefore designed to stimulate further discussion and suggest additional lines of research. At the same time, it addresses (if only in a preliminary way) some policy implications for the United States, particularly as regards Chinese interest in advanced technology. This study was done under the Project AIR FORCE research project "China's Strategic and Regional Role in Asian Security."

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SUMMARY

Chinese decisionmakers have used various strategies in their past efforts to modernize their defense establishment. Any effort to amend previous strategies will be constrained both by the competing demands of other economic sectors and by continuing deficiencies in China's scientific and industrial manpower base. Affecting these constraints in a significant way can succeed only as part of a systematic long-term development effort.

A "quick-fix" defense option for the PRC (that is, one premised on rapid assimilation of advanced foreign military technologies and extensive weaponry purchases abroad) is not feasible for Chinese security planners. To attempt such a strategy would severely tax the available budgetary and manpower resources. It would also compromise a 20 year effort to create an indigenous base for military research and production, even though the domestic defense industries lag significantly behind the technological capacities of the superpowers. Of necessity, therefore, Chinese security strategy will continue to rely heavily on both a political and diplomatic component, rather than depending exclusively upon military acquisitions and deployments.

These findings are not intended to suggest that the PRC's interest in acquiring advanced foreign technology is more feigned than real. Rather, Chinese security planners recognize that any major transformation in the qualitative characteristics of the PRC's armed forces will occur only after a prolonged process of negotiation and technological absorption. Policymakers in the United States must remain mindful of the very real manpower and budgetary limitations that will continue to affect the weapons acquisition process in China. For both the United States and its allies, continued awareness of these considerations will contribute to an effective policy framework for technology transfer to the PRC.

ACKNOWLEDGMENTS

Many of the arguments presented here were delivered in preliminary form to the Workshop on the Development of Industrial Science and Technology in the People's Republic of China: Implications for U.S. Policy, held at St. George's, Bermuda, 3-7 January 1979. The author would like to thank the workshop organizer, Richard Baum, for the invitation to participate in these meetings. Several workshop participants contributed to the author's understanding of the complex issues touched upon in this study. In addition, Rand colleagues Wendy Allen, Hans Einstein, Anna Sun Ford, and Richard Solomon commented and made suggestions on an earlier draft. Any remaining shortcomings are the responsibility of the author.

DEFENSE MODERNIZATION IN THE PEOPLE'S REPUBLIC OF CHINAINTRODUCTION

This note has four objectives. The first is to briefly review the accomplishments and shortcomings of the People's Republic of China (PRC) in the acquisition and manufacture of modern arms. Second is to consider military modernization in the context of China's existent or emergent industrial, technological, and manpower capacities. Third is to consider the choices and development strategies available to Chinese decisionmakers for further enhancing their defense capacities (both historically and at present). Finally, recent activities suggesting heightened PRC interest in purchasing newer defense technologies from abroad are examined in terms of their potential for departing from past Chinese policies and their policy implications for the United States.

Decisionmakers in China have long been preoccupied with the modernization of Chinese national defense capacities. In terms of the specific content of various efforts to enhance Chinese military power and the major consequences deriving from such decisions, modernization encompasses a diverse and complex range of political, economic, and organizational choices. Modernization denotes more than simply selecting among various advanced technologies, although such choices are an integral part of this process. Decisions related to military acquisition also exert a major and direct influence on basic industrialization strategies and the resource allocation process, the manpower and training requirements for China's armed forces, and the defense doctrines espoused by the PRC's military leadership. Less directly but no less critically, debates over defense modernization have served as the vehicle for elite political conflict at the highest decisionmaking levels. Thus, a comprehensive view of this issue must pay heed to the entire range of decisions, issues, and programs involved in (and affected by) such a policy objective.

Rather than review the full spectrum of China's military needs or analyze recent leadership debate on security issues in any detail [1], this essay addresses a variety of basic considerations related to

defense economics. The choices and dilemmas that Chinese military planners have had to confront are far from unique. For China as for all states, decisions related to national defense are ultimately ones of allocation. Toward what end, and with what degree of effort, are organizational capabilities most appropriately devoted? What amount of investment and expenditure does a given security need require, and how should alternative choices be weighed? If a given defense need seems particularly acute or pressing, what are the possible consequences for competing budgetary and technological requirements, whether military or nonmilitary?

Although each of these questions is central to any allocation decision, the actual process of determining "how much is enough" is not nearly as rationalized or coolly analytical as the label implies. Indeed, beyond a minimal consensus on the necessity of enhancing China's defense capabilities, substantial diversity in opinion and outcome has long been apparent--on what to acquire, how much, how quickly, by what means, and for what purposes. [2] More important, China remains a labor-intensive economy with a growing but still small advanced industrial sector. As a U.S. government study has noted, "The Chinese military in many ways mirrors the economy that supports it." [3] China's heavy reliance upon its large reserves of manpower and low-technology weaponry no doubt reflects past political and organizational decisions. Even more fundamentally, however, it accords with the nation's actual economic circumstances. Such constraints will be overcome only by a prodigious, long-term development effort, not only in the defense sector but throughout China's economy.

CHINA'S MILITARY CAPABILITIES: A BRIEF REVIEW

This is not to slight China's accomplishments in military research, development, and production. Although the PRC's current military strength does not even begin to rival the technological sophistication of American or Soviet power, it does constitute a substantial and significant combat force within East Asia. Much of this strength, to be sure, derives from sheer numbers rather than the qualitative characteristics of specific weapons systems. At the close of the 1970s, for

example, China maintains the world's largest land army (currently numbering more than three million) and an armed militia estimated at seven million. [4] Beijing's naval and air forces rank as the world's third largest. The output from China's defense plants enables the People's Republic to transfer significant quantities of arms to various third world states. [5] According to U.S. estimates, Chinese military expenditure in 1977 totaled \$35 billion, the third highest figure globally. [6] In addition, the acquisition and development of nuclear and thermonuclear weaponry has been a major policy objective for 20 years, with modest but growing delivery systems now in operation.

No matter how impressive these quantitative achievements, the qualitative attributes of Chinese weaponry lag severely behind the capabilities the Soviet Union has arrayed against China. Even more telling, the PRC could well begin to lag behind potential or actual rivals in the third world in some areas. For example, India's recent agreement to acquire the Jaguar, a Franco-British deep penetration aircraft, will give the Indian Air Force a plane clearly superior to any in the present Chinese inventory.

Since the fall of 1976, Chinese defense planners have shown increased concern for China's military preparedness. Frank assessments of the PRC's defense readiness and concern about various military vulnerabilities have appeared in the Chinese press and are being conveyed to visitors from the West and Japan. There has also been a renewed receptivity to the introduction of advanced defense technology from abroad, manifested by the numerous visits of Chinese military delegations to various European armaments plants and to active duty military units, and by widespread expectations (thus far not realized) of Chinese purchases of modern weaponry from France, the United Kingdom, and other supplier states. [7].

No in-depth attempt will be made in this essay to assess these inquiries. Nevertheless, the absence of any major agreements, despite years of intermittent reports to the contrary, should caution against the likelihood of Beijing becoming a major market for advanced defense technology from the West in the near future. This judgment is reinforced by the decided PRC preference for indigenous production of military hardware, an issue to be explored further below. Moreover,

notwithstanding the inherent sensitivity of the defense modernization issue and the absence of any detailed official statements about its relationship to China's development plans in other key sectors, the needs of national defense clearly remain a lower priority in Beijing's present economic plans. The 1970s have been marked by a sustained military confrontation between the Soviet Union and China, yet U.S. estimates of PRC defense spending indicate that Chinese military expenditure remained fairly constant between 1972 and 1977, although industrial production during this period grew by more than one-half. [8] Given the recently promulgated policy of "consolidation and adjustment," with the consequent reduction in heavy industrial investment between now and the early 1980s, this pattern will probably continue for the foreseeable future.

In a more long-term sense, leaders in China are likely to become increasingly more conscious and explicit about the shortcomings and possible vulnerabilities of the Chinese armed forces in relation to their various regional rivals and adversaries. As recently released official data indicate, the PRC's border conflict with Vietnam in early 1979 has already compelled Beijing to increase its budgetary allotment for national defense by more than 20 percent over the 1978 figure. [9] And, regardless of whether Chinese military inquiries abroad soon yield any major agreements, such activity has greatly increased the exposure of senior military commanders and defense production personnel to an extensive and impressive range of modern weaponry, particularly for the ground and air forces. Over time, the proponents of heightened attention to the defense sector could well become more voluble and well informed in their policy advocacy. Indeed, notwithstanding the belief that military modernization ranks at the bottom of China's "four modernizations" (agriculture, industry, national defense, and science and technology), many of the PRC's present targets and goals in both industrial and scientific development will bear very directly on future Chinese military capacities. Various engineering and manufacturing skills that are now being upgraded can be applied to defense as well as civilian production; research developments in such areas as lasers, metallurgy, optics, communications, and computers will also be critically important in the defense sector.

DEFENSE MODERNIZATION: TECHNOLOGICAL, ECONOMIC, AND MANPOWER CONSIDERATIONS

China's military modernization will progress only as far as available industrial, technological, and budgetary capacities permit. This observation is particularly true for defense sectors that are especially deficient or outmoded--that is, depending heavily on various advanced technologies, where China's economy is weakest. Indeed, American governmental sources believe that the proportion of China's advanced industrial sector committed to defense production is already "far larger . . . than is the case in the U.S. or the U.S.S.R." [10] Such considerations lend some perspective to the obvious dilemmas and difficulties currently facing China's economic and military planners in terms of basic investment strategies and specific allocation priorities. No matter how important particular defense needs might be judged by some decisionmakers, the consequences of investing the requisite manpower and budgetary resources to accomplish a given task could adversely affect other goals in China's national development program. Outright purchases of off-the-shelf weaponry from abroad represent another possibility, but they have not been undertaken on an extensive scale since the early years of the Sino-Soviet alliance. The staggering costs of such purchases, given the sheer size of the Chinese armed forces, would rapidly deplete China's currency reserves available for purchasing foreign technology. Even exempting any possible purchases in the defense area (where several contracts reportedly under negotiation are valued in excess of \$1 billion), China's foreign technology budget for the 1978-85 period is already estimated between \$52 and \$59 billion. [11]

In addition, for two decades China has made a major effort to develop an indigenous arms industry so as to avoid the potential complications and dependency that might result from outright purchase of end items. This policy, however, creates its own dilemmas. Although there is a decided preference for domestic manufacture of needed components and weapons systems, the items produced within China will reflect the nation's technological and engineering standards. These levels obviously lag behind the achievements of China's principal rivals, thereby leaving the PRC potentially at a military disadvantage in various conflicts.

How have decisionmakers sought to resolve these recurrent policy dilemmas? Is it possible to minimize the potential negative consequences of substantial investment in the defense industries, without unduly jeopardizing Chinese security? China's leaders (both military and civilian) have never been very forthcoming about their efforts to resolve such choices. It is clear, however, that there are no entirely satisfactory solutions for these problems.

Even in the absence of detailed official assessments, it is possible to reconstruct past policies, thereby helping to identify the probable directions for present and future planning. One conclusion seems inescapable: Chinese defense planning and weapons acquisition policies have always been premised on a long-term perspective. Unless there is an abrupt change in diplomatic and foreign policy strategy, Chinese security policy simply does not have a "quick fix" option.

The strictly military dimension of PRC security strategy can be based only on a logical but incremental progression in the development of indigenous defense production capacities. Sustained attention must be devoted to cultivating an extensive range of scientific and technical skills. Defense modernization encompasses far more than gaining access to particular equipment or defense items. [12] A full-scale, autonomous industry requires considerable practical experience with numerous technological, engineering, and manufacturing capabilities and assembly at the scientific and managerial infrastructure for research, development, and production. To fully equip and maintain a modern military force will also require the extensive training of military personnel to use such equipment appropriately and the necessary technical expertise and familiarity to maintain, repair, or otherwise refurbish modern weaponry.

The level and degree of competence achieved in these realms are good measures of the extent of a given nation's independence in national defense production, not to mention in industrial development more generally. By such criteria, China has advanced further toward military self-sufficiency than any other third-world state. Though it is fashionable to dismiss Chinese weapons as antiquated and militarily suspect, such commentaries ignore several key considerations.

In selected realms and for particular needs, Chinese factories produce more than representative military equipment. The AK-47 rifle, for example, is widely considered among the finest infantry weapons in the world. Chinese weapons have often proven adequate to the combat situations encountered by Beijing's armed forces, though this record derives in part from the PRC's extreme reluctance to enter conflicts that threatened to escalate to levels well beyond China's available military capabilities. Nevertheless, success in warfare cannot be wholly attributable to the sophistication of available military technology.

Regardless of the shortcomings of specific weapons, China currently possesses its own network of defense industries across the entire spectrum of military needs. At the time of the establishment of the People's Republic in 1949, Chinese weapons inventories consisted exclusively of captured Japanese, American, and Guomindang stocks, combined with whatever production domestic factories could furnish and modest amounts of Soviet aid. Through grants, transfers, and purchases during the Korean War, China rapidly began the transformation to a modern national defense force with pronounced results in the creation of an air force and modern infantry and armored units. Following the end of the Korean War, attention turned to the creation of manufacturing facilities under Soviet license. By the late 1950s, these plants were producing military equipment in all categories of need, including jet aircraft. With the abrupt cessation and withdrawal of Soviet advisory assistance in 1960, Chinese scientists and engineers quickly had to undertake the independent management of all arms plants. Although China encountered serious setbacks and difficulties, by the late 1960s production had resumed in all key defense facilities--independently of foreign management or control. [13] By this time China had achieved self-sufficiency (if not an independent design capability) in most areas of defense manufacture. This included the ability to "reverse engineer" key weapons systems for which only prototypes or limited supplies were available, such as the TU-16 intermediate bomber. [14]

To move beyond such production capacities and toward a self-sustaining design and manufacturing effort is far more difficult, and only modest beginnings have been made in this area. The first such step is the ability to modify and improve existing designs. Chinese scientists and engineers have pursued this goal in certain areas of defense production since the late 1960s, but with very uneven results. The felt urgency to break free of past restraints and demonstrate an ability for self-sustaining design and manufacture is understandable but not easily realized in the context of asserting national independence. China's experience with the F-9, the nation's first domestically designed and produced fighter aircraft, offers an instructive example. Since it first appeared in 1970, the aircraft has been produced only in limited numbers and is judged a failure (or at best a partial success) by outside military observers. Indeed, whether the aircraft should be deemed wholly Chinese or simply a modified MiG-19 remains an open question. [15] Comparable difficulties in improving upon available Soviet technology in both the naval and ground forces provide further evidence of this recurrent problem. Only in the area of strategic weaponry, where the PRC in the 1960s made an enormous commitment of time, money, and manpower, has China gradually begun to develop weapons systems that depart significantly from the components initially furnished by the Soviet Union. China's experiences in defense production amply illustrate the long-term effects of technological dependence, given the disparate, highly complex skills that are called upon in the manufacture of sophisticated weaponry.

THE SEARCH FOR NEWER TECHNOLOGIES: STRATEGIES FOR ABSORPTION AND ACQUISITION

The capability for truly indigenous design and production requires the development of an industrial infrastructure with both the technical sophistication and incentive structure to move beyond existing models and systems. This level of scientific and technological competence still remains the exclusive preserve of the major industrial powers and seems certain to remain so for the foreseeable future. Chinese military planners are under no illusions about the potential sources

of technology for their current effort to upgrade the nation's defense capabilities. Now, as in the past, China must look abroad.

But on what basis--political, managerial, and economic--are such technology transfers to be undertaken? For Chinese decisionmakers, the maintenance of indigenous control over production capabilities is the paramount consideration. The sheer size of China's military needs and of its armed forces make the outright purchase of weapons from abroad--even on an extended credit basis--a costly and risky long-term policy. Undue reliance on grants, purchases, and transfers could leave China vulnerable to the vagaries of the supplier state's policies and production capacities. Rather than risk such dependence, planners must attempt to broaden the sources of supply and manufacture components or completed weaponry on Chinese soil, even if this process takes many years and leaves the Chinese far behind their adversaries. Ideally, the Chinese will seek more than mere prototypes or outright transfer of finished weapons systems. By acquiring the means of production--through building indigenous production facilities and training Chinese scientists and engineers--military planners will be able to maintain their autonomy from external control.

The Sino-British jet engine agreement of late 1975 is most appropriately viewed in this context. [16] Negotiations were initially undertaken as early as 1972, proceeded sporadically for some time, and developed more fully during 1974 and 1975. The final agreement includes contractual obligations in three separate areas: (1) the supply of 50 supersonic Spey jet engines--the RB 168-25R, currently used in the British version of the F-4 Phantom and the Vought A-7 Corsair II close-support aircraft; (2) a license to manufacture these engines in a plant being built near Sian; and (3) the furnishing by Rolls Royce to the PRC of facilities and technical expertise for engine testing and maintenance. Although various press reports suggest that there have been difficulties and delays in completing the third segment of the agreement, [17] once completed, the project will have advanced Chinese jet propulsion technology well beyond current levels. More important, British engineers will have furnished China with the facilities and training necessary to

manufacture these engines without external assistance. Chinese jet engine technology will advance by at least a half dozen years, and China will have the requisite equipment and experience to produce and maintain such engines on an independent basis by the early or mid-1980s. With Chinese personnel ultimately assuming full responsibility for managing these production and maintenance operations, there will be little possibility of undue or unexpected leverage being applied by the supplier state. China's air force will then for the first time possess a fighter aircraft engine whose capabilities and limitations are not intimately understood by their Soviet counterparts.

PRC military planners will no doubt seek to emulate this strategy in any subsequent agreements on defense technology. Negotiations during the past several years between China and various Western European defense firms for selected modern weapons systems have included discussions of comparable arrangements. For example, Chinese officials have reportedly been negotiating an agreement with France for the purchase of several thousand HOT antitank missiles. This initial purchase would be intended for testing and training purposes but would be followed by parallel agreements to manufacture the missile under license within China. [18] China's prolonged negotiations with Great Britain for the Harrier vertical take-off and landing aircraft, by far the largest and potentially the most significant agreement under serious negotiation, reportedly involve comparable arrangements. According to accounts in the Western press, the PRC would initially purchase at least 70 of these aircraft along with various spare parts (a contract reportedly worth \$1.2 billion). Such a sale would then be followed by agreements on technical training and construction of an aircraft factory in China, where another 250 planes might be produced with British assistance over the next decade. [19]

Despite these reports--some claiming that agreements had already been reached--as of August 1979 there has been no official confirmation that any such negotiations have been successfully concluded. Numerous reasons have been suggested to account for the continuing uncertainties and delays. Chinese negotiators may well be more interested in examining and acquiring extensive familiarity with state-of-the-art military

technology than actually purchasing any equipment. Alternatively, the delays may well reflect continued disagreement among Chinese defense experts about the appropriateness and cost of various weapons systems whose purchase is under consideration. The PRC may be conducting such inquiries for political effect with regard to the Soviet Union rather than to acquire advanced military systems.

Not all the possible factors explaining such delays pertain to Chinese calculations. The PRC's insistence on gaining exposure to (and experience with) the design, engineering, and fabrication processes for such weaponry could well be encountering resistance from defense firms that would rather sell items than provide Beijing with the technological wherewithal to produce such equipment. Furthermore, the political sensitivity of technology transfer to the PRC (especially in defense) leaves many in the West somewhat wary about the wisdom of entering into such agreements. Whatever the reasons underlying these delays--and it could be an amalgam of these factors--the negotiation of long-term defense arrangements are clearly matters of major political and economic consequence.

Given the willingness of the Soviet Union to provide precisely such assistance to the PRC in the 1950s and the absence of alternate sources of supply, it should be no surprise that China turned so fully and unequivocally to the USSR at that time. Although the Sino-Soviet defense relationship resulted in extreme Chinese dependence on Soviet technology, the USSR's extensive assistance enabled the PRC to avoid a far more costly and complicated weapons acquisition process. The long-term effects of this dependence are very much in evidence today. Chinese armaments production in the late 1970s is still based almost wholly on Soviet designs, some of them initially transferred more than two decades ago. [20] This fact illustrates the enormous difficulties of incorporating new designs and manufacturing facilities into a preexisting industrial structure of such size and complexity. It also indicates the irregularity with which defense modernization has been pursued over the past decade. Finally, it suggests the understandable reluctance of Chinese planners to commit themselves unequivocally to new plant investment unless it is certain that old weaponry will no longer suffice.

Although Chinese writings no longer discuss the full extent of Soviet support for China's earlier defense modernization efforts, both official and unofficial sources in the USSR continue to describe such aid. During the Korean War, according to one of the more detailed accounts, "The cost--repaid by the Chinese side--of the arms equipment supplied to China by the USSR . . . amounted to only 20 percent of the total value of the Soviet military credits." Moreover, more than half the military credits granted during the 1950-55 period were purportedly used not for service in the Korean War but as part of the People's Liberation Army's (PLA's) modernization effort. Additional claims in this particular article seem wholly credible and merit extensive quotation:

Over the period 1950 through 1963, 71 enterprises of the military industry [out of more than 100 that had been pledged] were built in China with the participation of the Soviet Union. . . . The USSR Government set aside for China from its own available stocks sufficient weapons and military-technical equipment to reequip 60 PLA infantry divisions. Equipment which was located in Port Arthur was also handed over to the PRC. At the same time, the Soviet Union gave China documentation for organizing the production of new models of practically all types of modern military equipment, and sent a large number of specialists there who gave assistance both in setting up the production of new types of military equipment and also mastering the armaments which the PLA military units had received. Thanks to Soviet military assistance the PRC was able, prior to 1960, to devote less than 10 percent of its budget to military purposes. [21]

The scope of such assistance may well be unprecedented in the history of alliances. This conclusion is even more apparent when one adds the very substantial assistance given by the Soviet Union to the Chinese nuclear program--aid that was vital to Chinese successes in the strategic weapons area. [22] There is little doubting Khrushchev's rather regretful conclusion that

all the modern weaponry in China's arsenal [in the early 1960s] . . . was Soviet-made or copied from samples and blueprints provided by our engineers, our research institutes. We had given them tanks, artillery, rockets, aircraft, naval and infantry weapons. Virtually our entire defense industry had been at their disposal. [23]

Indeed, notwithstanding the total rupture of Sino-Soviet defense relations in the early 1960s, one should not rule out the possibility that newer Soviet weapons might ultimately (if rather unconventionally) find their way into Chinese inventories. Several Japanese press reports bear directly on this question. [24] According to these sources, Egypt and China reached agreement in 1976 whereby China would receive a variety of Soviet armaments originally furnished to Cairo in exchange for spare parts and maintenance help for Egyptian MiG-17s and 21s damaged in the 1973 war. Some cash may also have been involved. The transaction supposedly included an unspecified number of MiG-23 aircraft, surface-to-air missiles, antitank weaponry and T-62 tanks.

Assuming the truth of such reports, intriguing possibilities become available to Chinese defense engineers, especially in fighter aircraft. A hybrid fighter-plane is purportedly being based on an improved model of the Spey engine, with numerous other components being drawn from the MiG-23. If more advanced Soviet technology in such areas as airframes could be used for such an aircraft, it could be easily adapted to defense industry facilities originally built by Soviet engineers. There would presumably be comparable prospects in other areas where such weaponry might be available. The success of such efforts would lend even greater support to arguments favoring continued development of indigenous defense industries.

NATIONAL DEFENSE AND CHINA'S ECONOMIC DEVELOPMENT

Access to and experience with various technologies exert a singular influence on the pace and direction of China's military modernization, but this objective cannot be separated from the development process as a whole. Chinese writings now regularly discuss the ambitious goal of the "four modernizations," but attention to the complex interrelationships between national defense and other investment priorities remain highly guarded.

If a single conclusion is apparent from this analysis, it concerns the specialization inherent in advanced defense technology. Some (although by no means all) of the needs generated by national

defense requirements necessitate the investment of time, funds, and manpower that will be of only modest benefit to other industrial sectors. Thus, a key consideration in resource allocation is how best to integrate China's overall economic needs with the perceived imperatives of national security. This issue was less of a concern in the first two decades of Communist rule. During the 1950s, the Soviet Union (as previously discussed) gave China access to an exceptional range of defense technologies, including the basic infrastructure for an entire modern defense industry. Soviet assistance therefore enabled China to vastly reduce the percentage of state expenditure committed to national defense. [25] Although Chinese investment in machine-building and other defense-related industries was substantial, it was not nearly as dislocating as it would have been had there been no aid.

Although the Soviet withdrawal of 1960 had a pronounced effect on both civilian and military programs in China, it still did not alter the basic institutional arrangements established in the 1950s. The defense plants already built with Soviet help or then under construction could (once they were fully operational) produce weaponry deemed adequate for China's needs. Moreover, by concentrating principally on security needs in terms of deterrence (the development of nuclear delivery systems and reliance on a mass militia), China avoided the vexing decisions that would have been required if intermediate defense technology needs had been judged more pressing.

It is precisely such choices that Chinese policymakers have had to consider during the 1970s. As early as the spring of 1971, articles in the Chinese press acknowledged that the highly specialized requirements of nuclear delivery systems and other advanced weaponry clashed directly with more basic investment needs in industrial development. [26] The posing of two alternatives ("electronics versus iron and steel") was somewhat disingenuous, in that Lin Biao was accused of overemphasizing the former over the latter. It would have been more accurate to admit that, insofar as Chinese defense needs heavily emphasized the nuclear weapons program, it tended to somewhat restrict the range of technologies (and the amount of investment) that a more extensive defense modernization program would have entailed.

By the mid-1970s, Chinese military planners were beginning to look far more candidly toward their vulnerabilities in "middle range" defense considerations. Attacks on Deng Xiaoping in 1976 emphasized his supposed assertion that "fighting a modern war means fighting a war of steel." [27] Deng's opponents recognized that greater attention to a more differentiated national security agenda would unquestionably pose the issue of investment priorities in far more dramatic and consequential fashion than at any previous time.

This judgment has been amply borne out by the greater attention to military modernization apparent since the fall of 1976. To be sure, most analyses in the Chinese press (including those with military authorship) continue to assert that China's defense modernization still must follow overall improvements in economic construction, but some articles now voice a rather different argument with increasing candor and explicitness. In general, they suggest that a militarily secure China in the 1980s cannot depend on the investment priorities that have heretofore been deemed adequate. As one particularly pointed article has stated: [28]

In any future war against aggression, if anyone still thinks it's possible to use broadswords against guided missiles . . . then he evidently is not prepared to possess all the weapons and means of fighting which the enemy has or may have. This is a foolish and even criminal attitude.

Any future war against aggression will be a people's war under modern conditions. The suddenness of an outbreak of modern war, the complexity of coordinating ground, naval, and air operations, the extreme flexibility of combat units and the highly centralized, unified, planned, and flexible command structure--all these factors make it necessary for our army to have appropriate modern equipment.

For example . . . our armed forces must have an automatic computerized countdown, communications, and command system and rapid, motorized, modern transportation facilities. They must also be armed with conventional and strategic weapons so they can take quick and effective retaliatory action against any invading enemy. . . . Once [our armed forces] are armed with modern weapons, they will be like winged tigers and will become more invincible than ever.

Quite clearly, the consequences of such altered priorities would be profound. Even assuming substantial growth in the Chinese economy as a whole, the structural implications of attending to such investment needs would fundamentally affect the orientation of the PRC's modernization program.

It is too early in the process to tell how the potential conflicts between the expressed needs of defense planners and the more basic requirements of Chinese industrialization are to be reconciled. Nevertheless, several more refined policy arguments have already surfaced. One, voiced by numerous civilian decisionmakers, is to assert that defense needs, no matter how urgent they might appear, must still await sustained growth and improvements in basic industries and science and technology. [29] A second opinion, voiced in articles under military authorship, although acknowledging the importance of the development of the national economy as a whole, further asserts that "the defense industry . . . has considerable independence and initiative . . . [which] will inevitably continue to make new demands on other industries and on science and technology, thus motivating the development of the entire national economy." [30] A third viewpoint, aired by leaders charged with somehow reconciling such rival claims, offers the prospect of achieving simultaneous development: "Serious efforts should be made to implement the policy of integrating military with nonmilitary enterprises and peacetime production with preparedness against war, and fully tap the potential of the machine-building and national defense industries." [31] All such arguments, however, are necessarily somewhat self-serving. They reflect the increasingly complex interactions among technology, economics, and national defense that will continue to preoccupy Chinese policymakers in the coming decade, and for which no intermediate solutions or compromises are readily discernible.

CHINA'S MILITARY MODERNIZATION: THE CONTINUING DILEMMAS

Even assuming the prospect of political consensus on such complex and potentially divisive issues, three key considerations could still be left without adequate resolution. First is the issue of competing defense choices within the Chinese armed forces. The greater visibility

of arguments advocating enhanced military expenditure have only begun to touch on an equally difficult question: Which specific defense needs ought to take precedence? China's security needs remain vast and diverse. Competing military needs will require decisions on technology transfer and resource allocation that are highly divergent. At present, at least four areas of need are under debate in Beijing: infantry modernization; the upgrading of the air forces, including air defense; naval acquisitions; and the strategic weapons program. A further consideration tending to cut across all these issues is the systematic development of modern capabilities related to command, control, and communication. Each of these areas constitutes a compelling defense need, but it is extremely doubtful that China can contemplate simultaneous or equivalent efforts in all of them. The choices and dilemmas related to acquiring modern military technology are often far too consequential to expect adequate attention to each. As a result (not unlike the Soviet experience of the 1950s), there is increasing evidence of debate and cleavage on such basic choices for China's national defense. [32]

The second key question is less political or economic than managerial and institutional. Simply stated, can the Chinese economy absorb and fully integrate a major infusion of sophisticated defense technology over the next decade? Will there be a sufficient supply of highly trained scientists and engineers to operate and maintain new defense facilities and equipment? Do the Chinese armed forces have sufficient, adequately trained manpower that can appropriately utilize such equipment? Notwithstanding the absolute size of China's defense industries and of the PLA's various combat arms, the answers are far from certain.

Finally, and perhaps most important, is it in fact realistic to expect China's armed forces to approximate the technological proficiency of the PRC's past or potential military rivals by the year 2000? China is now seeking to purchase weaponry that currently represents state-of-the-art technology. Given the very prolonged process of fully integrating modern military equipment into a force structure, it could be the late 1980s or even later before the technology of the

early and mid-1970s is adequately introduced into the Chinese armed forces. Yet advances in military technology continue without letup. China's security planners may then find themselves in the unenviable position of having invested billions of dollars on improved military capabilities, only to find that the PRC continues to lag at least several generations behind the weaponry of the Soviet Union and the United States. To be sure, technology alone will not determine Chinese perceptions of the PRC's future security requirements, any more than it has in the past, but decisionmakers in Beijing must surely wonder whether the current military modernization effort has a reasonable chance of success. The absence of any unambiguous or certain answer is no doubt a cause for concern.

SOME POLICY IMPLICATIONS

The acquisition of advanced foreign technology will constitute one of the key issues for Chinese decisionmakers in the coming decade. Any major improvements in Chinese defense capabilities will depend heavily on the PRC's ability to negotiate major agreements with the advanced industrial states of the West, even if success in fully utilizing newer technologies will be influenced more by the capacity of the Chinese to mobilize their own manpower and management skills. It is therefore entirely appropriate that the PRC's security planners view this process in a long-term perspective.

The importance of the technology transfer question in China's modernization effort is matched by the need for leaders in the West and Japan to formulate an appropriate policy framework for this issue. A range of sensitive considerations currently face the advanced non-Communist industrial powers concerning the varieties of technology to which China will be allowed access, the manner of their transfer and absorption within the Chinese economy, and the uses to which new skills and equipment can be put. A comprehensive statement on these issues must await the completion of case studies examining technological levels attained by the Chinese in various branches of industry and the organizational and political influences that bear upon innovation decisions in the PRC. This concluding section instead briefly sketches some of the policy considerations that devolve from the findings of this study.

If the PRC's security planners continue to approach the technology acquisition question from a long-term perspective, then an equivalent view should guide American policy calculations. Decisions related to technology transfer should be considered less for any momentary advantage or leverage that such decisions might theoretically provide with regard to either China or the Soviet Union, and more in terms of their possible long-term consequences for the emergence of the PRC among the world's leading industrial and military powers. The symbolic effect (both for the Soviet Union and for America's Asian allies) of granting the Chinese access to various sensitive technologies should not be minimized, but this process cannot be based on expectations of any rapid changes in the qualitative characteristics of China's extant weapons systems. Even assuming that recent negotiations over defense technology culminate in the near future, the results of any agreements will not be fully evident in the Chinese armed forces until well into the 1980s. From the standpoint of Chinese defense planners, it may be more important to gain exposure to and experience with unfamiliar technologies than it is to transform the attributes of Beijing's weapons systems.

Such considerations pose the issue of technology transfer to China in a somewhat different light. Given sufficient time and the commitment of appropriate manpower and budgetary resources, China's future military potential could be profoundly affected by greater access to various modern weapons systems and the techniques associated with their design, production, and maintenance. Yet the imponderables remain considerable. Provision of such opportunities to the PRC in no way assures that more sophisticated defense capabilities will be fully or appropriately used. Research must estimate empirically the PRC's capacity to assimilate and use a range of newer technologies, being especially sensitive to the tendency to overestimate China's capabilities in this regard. Chinese scientists, engineers, and military planners have only begun to consider the potentialities and implications of such technologies, and they must do so under continuing manpower and resource constraints. Yet it is only by mobilizing the appropriate resources *within* China that Beijing can succeed in its ambitious plans to move to the front ranks of the world's powers within two decades. To suggest that the external world can fulfill these needs for the PRC is far too simplistic and overstated.

The United States and its allies have an obvious capacity to affect the scope, pace, and direction of the PRC's modernization effort in both the military and civilian areas, but this role is likely to be more instrumental than decisive. Specific decisions must nevertheless be based on a recognition of the potential effects of access to particular technologies, with respect to both improvements in specific military areas where the PRC's deficiencies are now most acute and the broader upgrading of China's industrial and scientific capacities. Policymakers, for example, should be sensitive early in any negotiating process to the consequences of granting the PRC access to a given technology or weapons system, especially if (as seems highly likely) Chinese negotiators actively seek the capacity to manufacture a particular defense item. Such agreements should be evaluated less in terms of any comparisons with current or projected U.S. or Soviet military capabilities, and more with respect to: (1) China's capacity to assimilate imported technology effectively, (2) the regional balance of forces, and (3) the potential capacity of the Chinese to transfer indigenously manufactured weaponry to third parties. An awareness of these considerations will place the issue of technology transfer to the PRC in its more appropriate political, military, and economic context.

NOTES

1. For a more detailed view of these questions, see Jonathan D. Pollack, "The Logic of Chinese Military Strategy," *Bulletin of the Atomic Scientists*, Vol. 35, No. 1, January 1979, pp. 22-33, and "Rebuilding China's Great Wall," *Bulletin of the Atomic Scientists*, forthcoming.
2. Jonathan D. Pollack, "China as a Military Power," in Onkar Marwah and Jonathan D. Pollack (eds.), *Military Power and Policy in Asian States: China, India, and Japan*, Westview Press, Boulder, Colorado, 1979, pp. 43-99.
3. Statement of George Bush (then Director of Central Intelligence), May 27, 1976, in *Allocation of Resources in the Soviet Union and China--1976*, Hearings Before the Subcommittee on Priorities and Economy in Government of the Joint Economic Committee, Congress of the United States--Part 2, Washington, D.C., 1976, p. 31.
4. Both figures are taken from *The Military Balance, 1979-1980*, International Institute for Strategic Studies, London, 1979, pp. 60-61.
5. According to U.S. government data, between 1973 and 1977 China transferred approximately \$870 million in arms to third world states, thereby making the PRC the world's ninth leading arms exporter for this period. *World Military Expenditures and Arms Transfers, 1968-1977*, U.S. Arms Control and Disarmament Agency, Washington, D.C., 1979, p. 155.
6. Ibid., p. 38. No doubt this figure in part reflects the sheer size of China's armed forces, given a military force of such enormous absolute numbers. But it also suggests how serious a preoccupation national defense has been for China. Although comparisons are not wholly apt, the 1977 data on the other major military spenders offer some perspective on this figure: USSR--\$139.8 billion; United States--\$100.9 billion; Federal Republic of Germany--\$16.3 billion; and France--\$14.8 billion. Ibid., p. 6. Budgetary data recently released by the PRC differ markedly from U.S. estimates of Chinese defense expenditure. According to Chinese figures, the 1977 defense budget totaled \$8.05 billion, with increases to \$9.98 billion for 1978 and \$12.8 billion for 1979. The 1979 figure represents more than 18 percent of total PRC state expenditure. Zhang Jingfu, "Report on the Fiscal State Accounts for 1978 and the Draft Budget for 1979," *Beijing Review*, No. 29, July 20, 1979, pp. 18, 23. The dollar figures cited represent a yuan-dollar conversion rate of 1.6.
7. See Paul H. B. Godwin, "China and the Second World: The Search for Defense Technology," *Contemporary China*, Vol. 2, No. 3, Fall 1978, pp. 3-9.

8. This information derives from an analysis of Chinese defense expenditures undertaken by the Office of Strategic Research of the Central Intelligence Agency, to be published by the Joint Economic Committee of the U.S. Congress during 1979.
9. Zhang Jingfu (cited in item 6), p. 23.
10. George Bush (cited in item 3), p. 31.
11. See the table in *The China Business Review*, Vol. 6, No. 2, March-April, 1979, p. 57.
12. For recent Chinese sources that show an explicit awareness of central dimensions of this modernization process, see "March Toward the Modernization of Science and Technology for National Defense," *Jiefangjun Bao* (Liberation Army Daily), Editorial, September 24, 1977, in *Renmin Ribao* (People's Daily), September 25, 1977, p. 3; "Integration of 'Millet Plus Rifles' With Modernization" (article written by the theoretical group of the National Defense Science and Technology Commission), in Peking Domestic Service in Mandarin, January 20, 1978, in *Foreign Broadcast Information Service Daily Report--People's Republic of China* (FBIS-PRC), January 23, 1978, pp. E1-6; and *Jiefangjun Bao* newsletter, in Peking Domestic Service in Mandarin, March 22, 1978, *FBIS Daily Report--PRC*, March 24, 1978, pp. E12-13.
13. For a detailed overview of Chinese efforts in machine-building generally, but with additional attention to the military realm, see Jack Craig, Jim Lewek, and Gordon Cole, "A Survey of China's Machine-Building Industry," in Joint Economic Committee, Congress of the United States, *Chinese Economy Post-Mao*, Vol. 1, Washington, D.C., 1978, pp. 284-322.
14. Hans Heymann, Jr., *China's Approach to Technology Acquisition: Part I--The Aircraft Industry*, The Rand Corporation, R-1573-ARPA, February 1975, pp. 18, 23-24. Only two prototypes of the TU-16, a mainstay of China's nuclear delivery systems, were originally available to the PRC; they had been transferred to China in 1960.
15. Nikolai Cherikov, "The Shenyang F-9 Combat Aircraft," *International Defense Review*, Vol. 9, No. 5, October 1976, pp. 714-716.
16. This paragraph derives principally from "Breaking with the Past," *Far Eastern Economic Review*, Vol. 90, No. 52, December 26, 1975, p. 9; *Export Licensing of Advanced Technology: A Review*, Hearing Before the Subcommittee on International Relations, House of Representatives, April 12, 1976, Washington, D.C., 1976, pp. 7-8, 26-27; and "U.K. Assisting China in Spey Production Plan," *Aviation Week and Space Technology*, Vol. 105, No. 2, July 12, 1976, p. 16.

17. See, for example, the report in *Far Eastern Economic Review*, Vol. 98, No. 47, November 25, 1977, p. 5.
18. "Peking Said to Buy Missiles in France," *New York Times*, May 3, 1978; Jim Browning, "France Moves Ahead on China Arms Sales," *Christian Science Monitor*, October 24, 1978.
19. *The China Business Review*, Vol. 5, No. 6, November-December 1978, p. 68; Dinah Lee, "The Harrier Men Jump In," *Far Eastern Economic Review*, Vol. 103, No. 7, February 16, 1979, p. 28.
20. See, for example, Statement of Morton I. Abramowitz, then Deputy Assistant Secretary of Defense, East Asia and Pacific Affairs, April 6, 1976, in *United States-Soviet Union-China: The Great Power Triangle*, Hearings Before the Subcommittee on Future Foreign Policy Research and Development of the Committee on International Relations, U.S. House of Representatives, Washington, D.C., 1976, pp. 182-187; and Drew Middleton, "What the Chinese Forces Lack: Most Types of Modern Weapons," *New York Times*, June 24, 1977.
21. All the above citations are taken from O. Ivanov, "Peking's Falsifiers of the History of Soviet-Chinese Relations," *Mirovaya Ekonomika I Mezhdunarodnyye Otnosheniya* (World Economics and International Relations), No. 12, November 19, 1975, trans. in *FBIS Daily Report--Soviet Union*, January 14, 1976, pp. C8-9.
22. This issue is discussed much more extensively in Jonathan D. Pollack, "China as a Nuclear Power," in William H. Overholt (ed.), *Asia's Nuclear Future*, Westview Press, Boulder, Colorado, 1977, pp. 38-41.
23. Nikita Khrushchev, *Khrushchev Remembers--The Final Testament*, trans. Strobe Talbott, Little, Brown, Boston, 1974, p. 269.
24. See the Kyodo report from Peking, November 14, 1977, in *FBIS Daily Report--PRC*, November 15, 1977, p. E1; and a second Kyodo report from Tokyo (allegedly based on information from Japan Defense Agency sources), January 19, 1978, *FBIS Daily Report--PRC*, January 20, 1978.
25. Ivanov (cited in item 21), p. C9.
26. See, "Develop China's Iron and Steel Industry Under the Guidance of Mao Zedong Thought," *Renmin Ribao*, May 12, 1971, p. 3; and "A Criticism of the Theory of Making the Electronics Industry the Center," *Renmin Ribao*, August 12, 1971.
27. See, for example, Peking Domestic Service in Mandarin, August 4, 1976, in *FBIS Daily Report--PRC*, August 10, 1976, pp. E4-5; and the article by Shen Bing in *Hongqi* (Red Flag), No. 8, August 1976, *FBIS Daily Report--PRC*, August 24, 1976, pp. E1-7.

28. "Integration of 'Millet Plus Rifles' with Modernization" (cited in item 12), pp. E3-4.

29. See, for example, Li Xiannian's speech to the National Conference on Learning from Daqing in Industry, April 20, 1977, in *Renmin Ribao*, April 23, 1977.

30. "The Strategic Policy of Strengthening Defense Construction," *Guangming Ribao* (Enlightenment Daily), January 20, 1977, p. 2. The authors of the article are identified as the theoretical group of the National Defense Industry Office.

31. The citation is from Hua Guofeng's Report on the Work of the Government delivered at the First Session of the Fifth National People's Congress, February 26, 1978, in *Peking Review*, No. 10, March 10, 1978, p. 23.

32. On these issues, see the articles by Pollack in the *Bulletin of the Atomic Scientists* (cited in item 1).